BHARASUMBA: Jurnal Multidisipliner

http://azramedia-indonesia.azramediaindonesia.com/index.php/bharasumba/index
DOI : https://doi.org/10.62668/bharasumba.v4i04.1862
Email : info@azramediaindonesia.com

Open Access

THE EFFECT OF DIFFERENTIATED LEARNING IN THE INDEPENDENT CURRICULUM ON THE COGNITIVE DEVELOPMENT OF 5-6 YEAR OLD CHILDREN

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Info Article
Received :
01 Agustus 2025
Revised :
04 September 2025
Accepted :
04 Oktober 2025
Publication :
30 Oktober 2025

Keywords:
Differentiated Learning, Cognitive Development, Early Childhood
Kata Kunci:
Pembelajaran Berdiferensiasi, Perkembangan Kognitif, Anak Usia Dini

Abstract: *This study is entitled "The Effect of Differentiated Learning Models in the Merdeka Curriculum on the Cognitive Development of 5-6 Year Old Children". The problem addressed in this study is the low level of cognitive development in children. This study aims to determine whether there is an effect of the Differentiated Learning Model in the Merdeka Curriculum on the Cognitive Development of 5-6 Year Old Children. This study is a pre-experimental study with a one-group pre-test-post-test design. The sample in this study consisted of 15 children, comprising 9 boys and 6 girls. The data collection techniques used in this study were observation, testing, and documenta tion. The data analysis techniques used in this study were normality test, homogeneity test, and hypothesis test. The hypothesis results were obtained after conducting a pretest and posttest, then the researcher analyzed the research results. The data analysis results showed that there was a significant effect, as evidenced by the* $t\text{-}_{count} > t\text{-}_{table}$*, so* H_a *was accepted and* H_o *was rejected, which means that there was a significant effect of the use of the Differentiated Learning Model in the Curriculum on the Cognitive Development of 5-6 Year Old Children.*

Abstrak: Penelitian ini berjudul "Pengaruh Model Pembelajaran Berdiferensiasi Pada Kurikulum Merdeka Terhadap Perkembangan Kognitif Anak Usia 5-6 Tahun". Adapun yang menjadi permasalahan di dalam penelitian ini adalah rendahnya perkembangan kognitif anak. Penelitian ini bertujuan untuk mengetahui apakah terdapat pengaruh Model Pembelajaran Berdiferensiasi Pada Kurikulum Merdeka Terhadap Perkembangan Kognitif Anak Usia 5-6 Tahun. Jenis penelitian ini adalah Pre-Experimental dengan desain One Group Pre Test - Post Test. Sampel di dalam penelitian ini berjumlah 15 anak yang terdiri dari 9 anak laki-laki dan 6 anak perempuan. Teknik pengumpulan data dalam penelitian ini menggunakan observasi, tes dan dokumentasi. Teknik analisis data yang digunakan dalam penelitian ini adalah uji normalitas, uji homogenitas, dan uji hipotesis. Hasil hipotesis di dapatkan setelah dilakukan test awal (pretest) dan test akhir (posttest), selanjutnya peneliti menganalisis hasil penelitian. Hasil analisis data menyatakan terdapat pengaruh yang signifikan dibuktikan dengan hasil $t_{hitung} > t_{tabel}$ maka H_a diterima dan H_o ditolak, yang berarti terdapat pengaruh yang signifikan penggunaan Model Pembelajaran Berdiferensiasi Pada Kurikulum Merdeka Terhadap Perkembangan Kognitif Anak Usia 5-6 Tahun

INTRODUCTION

The curriculum is defined as a set of plans and arrangements regarding the objectives, content, and subject matter, as well as the methods used as guidelines for conducting learning activities to achieve specific educational goals. The curriculum is written and systematic, and must be used in every educational institution.

According to J Galen Saylor and William A. Alexander (in Nasution), theologically speaking, the curriculum is "The Curriculum is the sum total of school's efforts to influence learning, whether in the classroom, on the playground, or out of school". This means that the curriculum encompasses all of the school's comprehensive efforts aimed at influencing children's learning processes, whether they occur in the classroom, on the school grounds, or outside the school environment, including extracurricular activities. (Usdarisman et al., 2024) The curriculum is not limited to subject matter, but also includes all experiences designed to support learning both indoors and outdoors, which serve as guidelines in educational institutions.

The independent curriculum is a policy established by the government that gives every educational institution the freedom to innovate and develop curricula according to their needs. The Independent Curriculum implements a new paradigm, one of which is independent learning. Independent learning is used as an approach for educators to provide learning to students according to their interests and talents (Iskandar et al., 2023). By providing flexibility to educators and students in the learning process, it is hoped that effective and efficient learning can be created.

This curriculum change was made to respond to the challenges of an ever-changing era so that students will be able to compete in the future. Currently, the curriculum used in Indonesia is the Merdeka Curriculum. The Merdeka Curriculum was launched by the Minister of Culture, Research, and Technology, Nadiem Anwar Makarim, as an effort to evaluate and improve the previous curriculum. (Nisa, 2023).

The independent curriculum is a policy established by the government that gives every educational institution the freedom to innovate and develop curricula according to their needs. The Independent Curriculum implements a new paradigm, one of which is independent learning. Independent learning is used as an approach for educators to provide learning to students according to their interests and talents (Iskandar et al., 2023). By providing flexibility to educators and students in the learning process, it is hoped that effective and efficient learning can be created.

The Merdeka Curriculum also emphasizes the concept of enjoyable learning for everyone involved, such as teachers, students, and parents. Learning is presented through play and games. In the Merdeka Curriculum, the learning and assessment references are Learning Outcomes, no longer STPPA (standards for early childhood education service delivery) used in the 2013 curriculum. In short, independent learning in early childhood education is independent play (Munawar, 2022). The realization of learning activities that provide enjoyable and meaningful experiences for children will help the child's development process in accordance with their age.

In its implementation, the Merdeka Curriculum promotes the concept of differentiated learning as an approach that allows teachers to tailor the teaching and learning process to the characteristics, interests, and abilities of students. Differentiation means giving students the freedom to be creative with their learning experiences, without coercion. This is in line with the educational philosophy put forward by Ki Hajar Dewantara that education should demand that children achieve the highest possible level of safety and happiness, both as individuals and as members of society (Herwina, 2021). Educators give students freedom, namely the freedom to develop their potential and abilities, while still providing guidance and direction.

The main proponent of the concept of differentiated learning is Carol Ann Tomlinson. According to Tomlinson, differentiated learning is learning that recognizes and caters to the diversity that exists among learners in terms of learning. This diversity is related to learners' readiness to learn, interest in learning, and learning styles (Kristiani et al., 2021). Differentiated learning is an approach applied by educators with an awareness to respect the differences of each student. Implementing differentiated learning means providing a learning process that is tailored to the interests and needs of students, so that all aspects of their development can be facilitated optimally. (Kamil et al., 2023) The concept of differentiated learning emphasizes respect for differences in student abilities, making it suitable for application in early childhood education settings. (Ayuriski & Cucu, 2024) This is because it accommodates differences in abilities and learning styles among young children.

The use of appropriate learning methods and media can help educators deliver material that can influence children's learning motivation and learning outcomes (Nurfadhillah et al., 2021). The learning provided must take into account the diversity of characteristics and abilities possessed by children. This is because each child has unique abilities and potential, as well as different abilities from one another. One type

of learning that accommodates differences in learning abilities among students is differentiated learning. Differentiated learning is a method used by educators to recognize and teach according to the talents and learning styles of each student (Haratua et al., 2024). The development that occurs in every child is systematic, progressive, and continuous. Development moves gradually but consistently and inevitably, through stages that become increasingly advanced from birth to the end of life. (Talango, 2020) These changes include physical, motor, language, cognitive, social-emotional, and moral development. All aspects of a child's development are included.

According to Piaget, cognitive development is an internal process that occurs in the brain when humans are thinking. Cognitive abilities develop gradually along with the development of the physical and neurological structures in the human brain (Sofyan, 2015). In line with this, Mena & Eyer describe the definition of cognitive development as the process of gathering information that a person uses to adapt to their environment in order to gain experience. Children's cognitive development will develop rapidly when they receive good stimulation/stimuli in accordance with their age stage (Retnaningrum & Umam, 2017).

According to Gagne, cognition is a process that occurs internally in the nervous system when humans are thinking (Melda Fitriani K et al., 2022). Cognitive is a term used by psychologists to describe all mental activities related to perception, thought, memory, and information processing that enable a person to acquire knowledge, solve problems, and plan for the future, or all psychological processes related to how individuals learn, pay attention, observe, imagine, estimate, assess, and think about their environment. (Wardani et al., 2023).

According to Yusuf, cognition is a child's ability to think more complexly, reason, and solve problems (Khadijah & Amelia, 2020). Cognitive development according to Vygotsky's theory states that the socio-cultural environment plays a major role in children's cognition and way of thinking. In his view, child development consists of an endless flow of conflict and dialectical resolution, and children form their knowledge through a process of problem solving that is internalized (Hyun et al., 2020). Differentiated learning facilitates children in developing their talents, interests, creativity, and independence. Using differentiated learning methods can improve children's abilities, especially in the cognitive domain.

Several studies have shown that using differentiated learning can improve children's cognitive abilities. One such study was conducted by Framesti Putri Intan Kusuma (2024) entitled “The Application of Differentiated Learning to Improve Cognitive Abilities in IPAS Subjects in Grade V of Sdn 14/1 Sungai Baung.” The results of the study show that the application of differentiated learning has been proven to improve students' cognitive abilities. This is reflected in the test results, which continued to improve with each cycle. In the first meeting of cycle I, the average test score reached 71% with 16 students out of a total of 25 students passing, resulting in a classical percentage of 57.14% in the “poor” category. In the second meeting of cycle I, the average score increased to 78%, with 20 out of 28 students passing, resulting in a classical percentage of 71.42% in the adequate category. Furthermore, in the first meeting of cycle II, the average test score reached 79%, with 23 out of 28 students passing, resulting in a classical percentage of 82.14% in the good category. In the second meeting of cycle II, the average score increased again to 86%, with 24 students out of a total of 28 students completing the course, resulting in a classical percentage of 85.71% with a very good category. Therefore, the researcher wanted to make improvements by applying this differentiated learning model to early childhood education (PAUD) schools because differentiated learning models are rarely used in PAUD institutions.

Based on the results of observation, the cognitive development of children in group B at Al-Ikhlas Karang Jaya Kindergarten, Belitang II District, can be said to be very delayed. This information was obtained when the researcher conducted direct observation during learning activities. Of the fifteen students, there were five children who were unable to distinguish between round, square, and triangular shapes during activities classifying objects according to their shape. Two children were unable to name colors in the order they were drawn, and three other children still made mistakes when naming them. Two children were still confused when asked to count from one to fifteen, and three children still mixed up the numbers when naming them.

Based on interviews and observations with several educators, it is known that even though they have implemented the independent curriculum, not all educators necessarily implement differentiated learning. Most educators still conduct learning using lecture methods, showing educational videos, question and answer sessions, and theme books. Learning is still carried out in a classical manner. The reason for this is

that educators are accustomed to conducting teacher-centered learning. This makes it difficult for educators to implement differentiated learning.

Based on the above discussion, the author is interested in conducting research related to differentiated learning with the title "The Effect of Differentiated Learning in the Merdeka Curriculum on the Cognitive Development of 5-6 Year Old Children at Al-Ikhlas Karang Jaya Kindergarten." This research is motivated by the low cognitive development of children, especially in problem-solving. In addition, the learning process at Al-Ikhlas Karang Jaya Kindergarten still uses a classical learning model, which is still conventional in nature. Therefore, the researcher will assist in the cognitive development of children by using a differentiated learning model.

METHOD

The research approach used in this study is a quantitative approach with an experimental research design because the data will be generated in numerical form. This study is an experimental research method using a pre-experimental design in the form of a one-group pretest-posttest-posttest design. This research design consists of one group with no control group, and the research process is carried out in three stages, namely pretest, treatment, and posttest (Yusuf, 2021).

The population of this study consisted of all 30 students at Al-Ikhlas Kindergarten, which has two classes: group A for 4-5 year olds and group B for 5-6 year olds. The research sample was taken using purposive sampling. The sample used in this study, based on the researcher's needs, was Group B children aged 5-6 years. This consisted of all 15 students in Group B at Al-Ikhlas Kindergarten.

The data collection techniques used in this study were observation, testing, and documentation. The data analysis techniques used in this study were normality testing, homogeneity testing, and hypothesis testing. There is a provision in hypothesis testing that if the Sig value is greater than 0.05, Ho is rejected, and conversely, if the Sig value is less than 0.05, Ho is accepted.

RESULTS AND DISCUSSION

Learning in early childhood education must be effective, supported by aconducive learning environment, and take into account the readiness, interests, and diverse learning styles of children, so as to enhance the cognitive development of 5-6 year olds. In this study, the researcher used a differentiated learning model, namely

learning that facilitates children to develop their talents, interests, creativity, and independence. Of course, the material used by the researcher to implement this differentiated learning has gone through a validation phase by subject matter experts in order to increase children's learning motivation, especially to enhance their cognitive development.

In accordance with Permendiknas No. 137 of 2014 concerning Early Childhood Education Standards, the cognitive development of children aged 5-6 years includes: learning and problem solving, which covers the ability to solve everyday problems in a flexible and socially acceptable manner, as well as applying knowledge and experience in new contexts. Logical thinking includes various differences, classifications, patterns, initiative, planning, and recognizing cause and effect. Symbolic thinking includes the ability to recognize numbers, letters, and be able to represent various objects and imaginations in the form of pictures. (Susilawati et al., 2020)

The researchers used a differentiated learning model, namely learning that facilitates children to develop their talents, interests, creativity, and independence. Of course, the materials used by the researchers to implement this differentiated learning had undergone a validation phase by subject matter experts in order to increase children's motivation to learn, especially to enhance their cognitive development.

Based on research by Framesti Putri Intan Kusuma (2024) entitled "The Application of Differentiated Learning to Improve Cognitive Abilities in Social Studies in Grade V at Sdn 14/1 Sungai Baung". The results of the study show that the application of differentiated learning has been proven to improve students' cognitive abilities. This is reflected in the test results, which continue to improve with each cycle. In the first meeting of cycle I, the average test score reached 71% with 16 students completing the test out of a total of 25 students, resulting in a classical percentage of 57.14% in the poor category. In the second meeting of cycle I, the average score increased to 78%, with 20 out of 28 students passing, resulting in a classical percentage of 71.42% in the adequate category. Furthermore, in the first meeting of cycle II, the average test score reached 79%, with 23 out of 28 students passing, resulting in a classical percentage of 82.14% in the good category. In the second meeting of cycle II, the average score increased again to 86%, with 24 students out of a total of 28 students completing the course, resulting in a classical percentage of 85.71% in the very good category.

In addition, research conducted by Niswah and Zulfahmi entitled "Implementation of Differentiated Learning to Improve the Social-Emotional Skills of Children Aged 5-6 Years" found that differentiated learning is effective in improving children's social-emotional skills. Children are given the freedom to choose activities according to their interests, talents, and abilities, so they learn with pleasure, comfort, and without coercion (Niswah & Zulfahmi, 2024). From the two studies above, it can be concluded that differentiated learning can improve children's abilities, especially in their cognitive development.

Table 1 Validity Test Results

Question Item	Validity			Description
	r_{hitung}	r_{tabel}	Criteria	
1	0.795887	0,514	Valid	Used
2	0.785434	0,514	Valid	Used
3	0.795887	0,514	Valid	Used
4	0.769429	0,514	Valid	Used
5	0.737346	0,514	Valid	Used
6	0.749614	0,514	Valid	Used
7	0.641171	0,514	Valid	Used
8	0.795887	0,514	Valid	Used

From the table above, it can be seen that the rtable with a significance level of 5% is 0.514. The result obtained is that each statement item has a value of 0.514. a value of $rhitung > rtabel$, so each item of the instrument is declared valid, meaning that the instrument can be used, because the data collected does not deviate from the description of validity.

Reliability testing is used to determine the consistency of measurement results when performed two or more times. Reliability is used to determine whether the instrument created is reliable and can be used as a data measurement tool. The formula used is the Alpha formula. The reliability results of this study after calculation obtained rhitung = 1.87 and rtabel = 0.514. Thus, it can be concluded that the instrument created by the researcher has very strong reliability. From the validity and reliability test results, the instrument is ready to be field-tested.

The pre-test was conducted by researchers to determine the initial condition of students experiencing problems in cognitive development aged 5-6 years at Al-Ikhlas Karang Jaya Kindergarten. The implementation of the pre-test was adjusted to the instrument items. The researcher observed all learning activities carried out from the beginning to the end of the learning process. During the pre-test, the researcher

observed the cognitive development of the children before they were given the treatment. The researcher gave scores to the children based on the results of the researcher's observations by checking the assessment guidelines according to the child's name.

Table 2 Pre-Test Data on Cognitive Development of Children Aged 5-6 Years

No	Child's Name	Score
1	AG	17
2	AI	19
3	AZ	16
4	AAI	17
5	EDS	18
6	AGS	17
7	ADS	16
8	EAS	16
9	HAA	18
10	EYA	15
11	YA	16
12	FA	16
13	PCA	15
14	AA	17
15	FZ	18

Based on the table above, the results of the pre-test data on children were tabulated. The results of the data obtained were the scores of children in cognitive development at the age of 5-6 years before the treatment was carried out, with the highest score being 38 and the lowest score being 30. The frequency distribution and graphic data are as follows:

Table 3 Frequency Distribution Table of Pre-test Scores Cognitive Development of Children Aged 5-6 Years

Nilai		F	X	F.X	x-$\bar{x}$	(x-$\bar{x}$) 2	f((x-x)2)	%
30	31	2	30.5	61	-3.46667	12.01778	24.03555556	13%
32	33	5	32.5	162.5	-1.46667	2.151111	10.75555556	33%
34	35	4	34.5	138	0.533333	0.284444	1.137777778	27%
36	37	3	36.5	109.5	2.533333	6.417778	19.25333333	20%
38	39	1	38.5	38.5	4.533333	20.55111	20.55111111	7%
Jumlah		15		509.5			75.73333333	100%
$(\bar{x}) = \frac{\Sigma fx}{\Sigma f} = \frac{509,5}{15} = 33,9$								

Based on the table above, it can be seen that in the first interval with a value of 30-31, there were 2 children with a percentage of 13%. In the second interval with a value of 32-33, there were 5 children with a percentage of 33%. The third interval with

a value of 34-35 has 4 children with a percentage of 27%. The fourth interval with a value of 36-37 has 3 children with a percentage of 20%. Then the last interval with a value of 38-39 has 1 child with a percentage of 7%.

The pre-test was conducted by the researcher to determine the cognitive development of the children after the treatment. The pre-test was conducted in accordance with the instrument items. The researcher gave scores to the children based on the results of the researcher's observations by checking the assessment guidelines according to the children's names.

Table 4 Post-Test Data on Cognitive Development in Children Aged 5-6 Years

No	Child's Name	Score
1	AG	26
2	AI	30
3	AZ	30
4	AAI	31
5	EDS	28
6	AGS	29
7	ADS	28
8	EAS	28
9	HAA	32
10	EYA	31
11	YA	30
12	FA	30
13	PCA	29
14	AA	29
15	FZ	32

Based on the table above, the post-test data on children was tabulated. The results of the data show the scores of children in cognitive development aged 5-6 years after treatment with the highest score of 64 and the lowest score of 52. The frequency distribution and data graph are as follows:

Table 5 Frequency Distribution of Post-Test Scores Cognitive Development of Chi.

Nilai		F	X	F.X	x-$\bar{x}$	(x-$\bar{x}$) 2	f((x-x)2)	%
51	53	1	52	52	-7	49	49	7%
54	56	3	55	165	-4	16	48	20%
57	59	3	58	174	-1	1	3	20%
60	62	6	61	366	2	4	24	40%
63	65	2	64	128	5	25	50	13%
Jumlah		15		885			174	100%

$$(\bar{x}) = \frac{\Sigma fx}{\Sigma f} = \frac{885}{15} = 59$$

Based on the table above, it can be seen that in the first interval with a value of 51-53, there is one child with a percentage of 7%. In the second interval with a value of

54-56, there are three children with a percentage of 20%. In the third interval with a value of 57-59, there are three children with a percentage of 20%. In the fourth interval with a value of 60-62, there are two children with a percentage of 40%. Then, in the last interval with a value of 63-65, there are two children with a percentage of 20%. The fourth interval with a value of 60-62 has 6 children with a percentage of 40%. Then the last interval with a value of 63-65 has 2 children with a percentage of 13%. After calculating the pretest and posttest data, the slope values obtained were 0.688 for the pretest and 0.221 for the posttest. Both values were less than 1, indicating that the data was normally distributed.

$$K_m = \frac{\bar{x}\, M_O}{S_1} = \frac{33{,}9 - 35{,}5}{2{,}325} = \frac{1{,}6}{2{,}325} = 0{,}688$$

$$K_m = \frac{\bar{x}\, M_O}{S_1} = \frac{59 - 59{,}8}{3{,}52} = \frac{0{,}78}{3{,}52} = 0{,}221$$

The homogeneity test is a test conducted to determine whether the sample used is homogeneous with the Ho test criteria accepted if Fcount >Ftable with a= 0.05. In this study, the homogeneity test was conducted using the F test, as follows.

$$F = \frac{varian\ terbesar}{varian\ terkecil} = \frac{2{,}325}{3{,}525} = 0{,}659$$

Based on the results of the homogeneity test, Fcount = 0.659, while dk numerator df = 15-1= 14 and denominator df 15=1=14 with a significance level of 5%, then Fcount is obtained using the linear interpolation formula F = 0.5 (14.14) = 2.40 because Fcount < Ftable, it can be concluded that the two data sets have equal variances or are homogeneous. After the data was found to be normally distributed and homogeneous, the next step was to answer the formulated hypothesis and address the existing problem formulation by conducting an analysis using the t-test to see whether there was an effect of differentiated learning on children's cognitive abilities. The formula for the t-test is as follows.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S\sqrt{\frac{1}{n}}} \quad \text{dengan} \quad S^2 = \frac{(n_1 - 1)s_1{}^2 + s_2{}^2}{n - 2}$$

From the above calculation, tcount = 50.20 is obtained, while to determine ttable with a significance level of a = 0.05, the value of a/2 is 0.025, dk= n-1 = 15-1= 14, so 0.02514 is obtained from ttable 2.144. Therefore, it can be concluded that the calculated t-value is greater than the table t-value, so the alternative hypothesis (Ha) is accepted and the null hypothesis (Ho) is rejected. This indicates that there is a significant effect of the use of differentiated learning methods on the cognitive development of children aged 5-6 years at Al-Ikhlas Kindergarten in Karang Jaya, Belitang II District, Oku Timur Regency. Therefore, based on the results of the above explanation, it can be concluded that differentiated learning in this learning can have an effect on children's cognitive development, so that children will easily understand the learning.

CONCLUSION

Based on the results of the research that has been conducted, in differentiated learning in the independent curriculum on the cognitive development of children aged 5-6 years, it can be seen from the comparison between the overall pretest results with an average of 34 and the posttest results with an average score of 59, which means that the average score after the treatment activity was given was higher than before the treatment activity was given.This is also proven by hypothesis testing through the t-test, which shows that the t-value is 1.33 and the p-value is 0.000. This is also proven by hypothesis testing through a t-test, which obtained a t-count of 50.20, while the t-table with a significance level of 5%, dk = n-1 = 15-1 = 14, resulting in a t-table of 2.144. Therefore, it can be concluded that t-count > t-table, so Ha is accepted and Ho is rejected, which means that there is a significant effect of the use of the differentiated learning model on cognitive development in 5-6 year old children at Al-Ikhlas Karang Jaya Kindergarten. From the data obtained, it can be seen that there is an effect of using a differentiated learning model on cognitive development in 5-6 year old children at Al-Ikhlas Karang Jaya Kindergarten.

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